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Original Research Article

Factors affecting the outcome of patients undergoing endoscopic septoplasty: a prospective study

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ABSTRACT

Background: A deviated nasal septum (DNS) refers to an abnormal displacement of the septum from the midline. Endoscopic septoplasty has gained popularity due to its minimally invasive nature and better visualization of the septal deformities. The nasal obstruction symptom evaluation (NOSE) score is a validated, patient-reported outcome measure used to assess the severity of nasal obstruction and the impact of surgical intervention.
Methods: A randomized prospective clinical study was conducted with total of 81 patients of either gender, aged between 17 to 60 years, diagnosed clinically and radio logically with deviated nasal septum and scheduled for endoscopic septoplasty surgery from April 2023 to October 2024. The patients were evaluated for NOSE score. After undergoing endoscopic septoplasty patients were followed up weekly for 2 weeks and then every 15 days till 1.5 months. Post-operatively after 6 weeks NOSE score was calculated and it was compared with the preoperative score.
Results: The study included total 81 patients aged 17 to 60 years, with the highest prevalence in the 21–30 age groups and has male predominance across ages. DNS to the right was the most common finding. A majority of patients showed significant symptom relief postoperatively, with 19 patients achieving complete resolution (no symptoms), 50 improved to mild, 12 to moderate category.
Conclusion: Factors including age, gender, persistence of symptom has no significant role in outcome of endoscopic septoplasty as most patient resulted in significant symptom relief. The NOSE score proved to be an effective tool for assessing nasal obstruction, demonstrating a significant reduction of mean postoperatively following endoscopic septoplasty.

Keywords: NOSE score, DNS, Endoscopic septoplasty, Patient satisfaction

INTRODUCTION

A deviated nasal septum (DNS) refers to the abnormal displacement of the septum from the midline, which may be congenital or acquired due to trauma. Its prevalence is high, with up to 80% of the population exhibiting some degree of deviation.[1] Clinical presentation varies with severity and compensatory changes such as turbinate hypertrophy, leading to nasal obstruction, recurrent sinusitis, snoring, and breathing difficulties.[2] While mild deviations may be asymptomatic, severe cases often require surgical correction to restore nasal airflow.[1] Patients typically present with nasal obstruction, mouth breathing, headaches, and recurrent upper respiratory infections. Diagnosis is primarily clinical, aided by anterior rhinoscopy, endoscopic examination, and computed tomography (CT) imaging in complex cases.[3]

Septoplasty is the preferred treatment for DNS, aiming to improve nasal airflow and relieve symptoms. Endoscopic septoplasty, performed using a rigid nasal endoscope, offers enhanced visualization and precision compared to the traditional approach.[4] It is associated with reduced postoperative pain, fewer complications, and faster

recovery.[5] Studies have shown superior patient satisfaction, particularly in posterior septal deviations that are challenging to access via conventional techniques.[6] Postoperative complications such as synechiae, septal perforation, and residual deviation are less common with endoscopic septoplasty.[7]

Outcomes after endoscopic septoplasty can be assessed using objective and subjective measures, though no universally accepted objective tool exists. Many previous studies on subjective outcomes were retrospective or used non-validated instruments. The development and validation of the outcomes instrument, named the nasal obstruction symptom evaluation (NOSE) scale, was developed by Stewart et al.[8] The NOSE score is a validated, patient-reported outcome measure assessing the severity of nasal obstruction and surgical impact.[9] It includes five Likert-scale items evaluating nasal congestion, breathing difficulty, and related quality-of-life issues, with scores ranging from 0–100, where higher scores indicate greater obstruction.[10]

The NOSE score is widely used to quantify pre- and postoperative nasal obstruction, enabling objective assessment of outcomes. Studies show significant improvement in NOSE scores following septoplasty, especially endoscopic, correlating with symptomatic relief and improved quality of life.[11] It can also be complemented by global or disease-specific quality-of-life instruments. Other questionnaires for nasal conditions include the sino nasal outcome test (SNOT-22), chronic sinusitis survey (CSS), rhino sinusitis disability index (RSDI), rhino-conjunctivitis quality of life questionnaire (RQLQ), and allergic outcome survey (AOS).[12-16] However, these were developed primarily for chronic sinusitis or allergic rhinitis, not for isolated nasal obstruction, though all are valid and reliable for assessing sino-nasal disease outcomes. The aim of this study was to evaluate the factors affecting the outcomes of patients undergoing endoscopic septoplasty. The objectives included assessing the demographic and clinical profile of patients, comparing pre- and postoperative symptom relief using the NOSE score, analyzing the incidence and nature of postoperative complications, and correlating these complications with the preoperative NOSE scores to better understand their impact on surgical outcomes.

METHODS

This prospective study was conducted from April 2023 to October 2024 on patients diagnosed with symptomatic This study was approved by Institutional Ethical Committee of this institute. Written informed consent was taken prior to the study of each participant. Deviated nasal septum (DNS) who presented to the eyes, nose and throat (ENT) outpatient department of GAIMS, G. K. G. H., Bhuj after obtaining approval from the Institutional Ethics Committee GAIMS, Bhuj (protocol no-IEC/RESCH/2023/54). A total of 81 patients were included. Patients were selected using a random sampling method and followed up for a duration of 1.5 months' post-intervention. Inclusion criteria comprised adult patients (≥17 years) with symptomatic DNS admitted for endoscopic septoplasty who provided informed consent. Exclusion criteria included pregnancy, lactation, active pulmonary tuberculosis, immunosuppression, history of previous nasal surgeries, unfitness for surgery, and loss to follow-up. All patients underwent a detailed clinical and radiological evaluation to confirm the diagnosis of DNS.

Preoperative assessment included recording of the NOSE score and routine investigations. After undergoing endoscopic septoplasty, patients were followed up weekly for two weeks and subsequently every 15 days up to 1.5 months. Postoperative NOSE scores were recorded at six weeks and compared with the preoperative values to assess symptomatic improvement.

The NOSE score assesses the severity of nasal obstruction based on five parameters: nasal congestion or stuffiness, nasal blockage or obstruction, difficulty breathing through the nose, trouble sleeping, and difficulty getting enough air during exercise or exertion. Each symptom is rated on a scale from 0 (not a problem) to 4 (severe problem). Total of each problem will be multiplied by 5 and we will get the final score out of 100. The total score, converted to a scale of 0–100, classifies the severity of symptoms as follows: no symptoms (0), mild (5–25), moderate (30–50), severe (55–75), and extreme (80–100). For example, if total of these 5 symptoms were 5 then (5×5= 25). Final score is 25, so it is considered as mild category.

Data was collected by case record form and entered into MS excel 2016. Data analysis was done in statistical package for the social sciences (SPSS) software version 25.

RESULTS

In the present study, there are total 81 patients, Figure 1 shows age and gender distribution of patients undergoing endoscopic septoplasty in which the highest prevalence is observed in the 21–30 age groups, with a greater number of male patients across most age groups.

Table 1 shows distribution of symptoms among patients in which right nasal blockage (43.3%) was the most common symptom, followed by left nasal blockage (37%) and bilateral nasal blockage (19.75%). Other reported symptoms included recurrent watering and sneezing (16%) and headache (6.17%).

Table 2 shows an analysis of the duration of symptoms experienced by patients before seeking treatment. The symptom duration is categorized into 5-year intervals, and the number of male and female patients in each group is recorded. The total number of patients in each duration category is also included. Most number of patients had 0-5 years' duration.

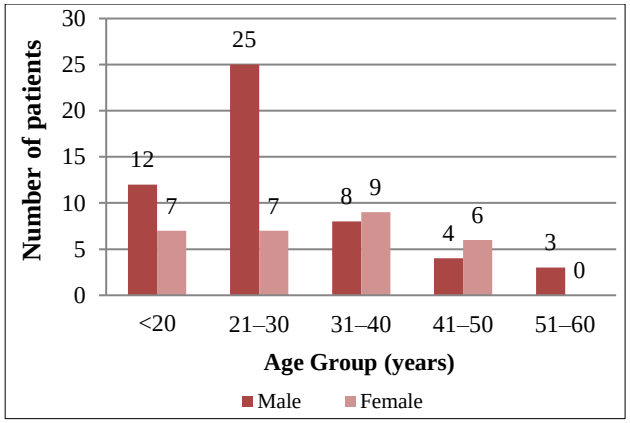

Figure 1: Age and gender distribution of patients.

Table 1: Distribution of patients according to symptoms.

Symptoms	Total patients	Percentage (%)
Right nasal blockage	35	43.3
Left nasal blockage	30	37
B/L nasal blockage	16	19.75
Recurrent watering and sneezing	13	16
Headache	5	6.17

Table 2: Duration of symptoms.

Duration (years)	Male	Female	Total patients
0-5	17	8	25
6-10	17	6	23
11-15	5	7	12
16-20	8	8	16
21-25	3	0	3
26-30	2	0	2
31-35	2	0	2

In examination findings in patients of our study, the most common finding was deviated nasal septum (DNS) to the right (55.5%), followed by DNS to the left (40.7%). S-shaped DNS was observed in 3.7% of cases. DNS associated with allergic rhinitis was present in 16.04% cases.

Table 3 shows NOSE score category shift in post-operative period, A majority of patients showed significant symptom relief postoperatively, with 19 patients achieving complete resolution (no symptoms). Notably, among 31 patients classified as severe (pre-op), 21 improved to mild, 8 to moderate, and 2 had no symptoms postoperatively. Similarly, all patients in the Extreme category experienced improvement, with none remaining in that classification postoperatively, demonstrating the procedure's effectiveness.

Figure 2 shows the comparison of preoperative and postoperative NOSE scores in patients and a significant improvement in nasal obstruction symptoms observed postoperatively, with a shift from severe (55–75) and extreme (80–100) categories to mild (5–25) or no symptoms.

Table 4 shows details of a comparative analysis of pre-operative and post-operative NOSE scores across different age groups. It includes the mean, range, and median for both pre-op and post-op scores, the mean improvement, and the statistical significance $p<0.001$ for each group. Highest improvement mean found in 51-60-year age group.

In gender-wise comparison of means both female and male patients showed significant improvement in nasal obstruction after septoplasty, with female having (mean improvement ± SD of 43.96±15.25 and males have 40.09±14.46 ($p<0.001$). Pre- and post-op scores were higher in females, but both groups experienced substantial symptom relief.

There was total 9 patients out of 81 patients who had complication post-surgery out of which crusting was seen in 6 patients and synechiae formation was present in 3 patients. All patients who developed complications had high preoperative NOSE scores (≥60), indicating severe to extreme nasal obstruction prior to surgery. This suggests that patients with more severe preoperative symptoms may be more prone to minor postoperative issues. Despite these complications, there was a marked postoperative improvement in NOSE scores across all patients shifting from severe or extreme preoperative categories to mild or moderate postoperative categories indicating that even those with complications experienced significant symptomatic relief.

Table 3: NOSE score category shift in post-operative period.

Category	Mild (post-op)	Moderate (post-op)	No symptoms (post-op)	Total
Mild (pre-op)	4	0	7	11
Moderate (pre-op)	19	0	10	29
Severe (pre-op)	21	8	2	31
Extreme (pre-op)	6	4	0	10
Total	50	12	19	81

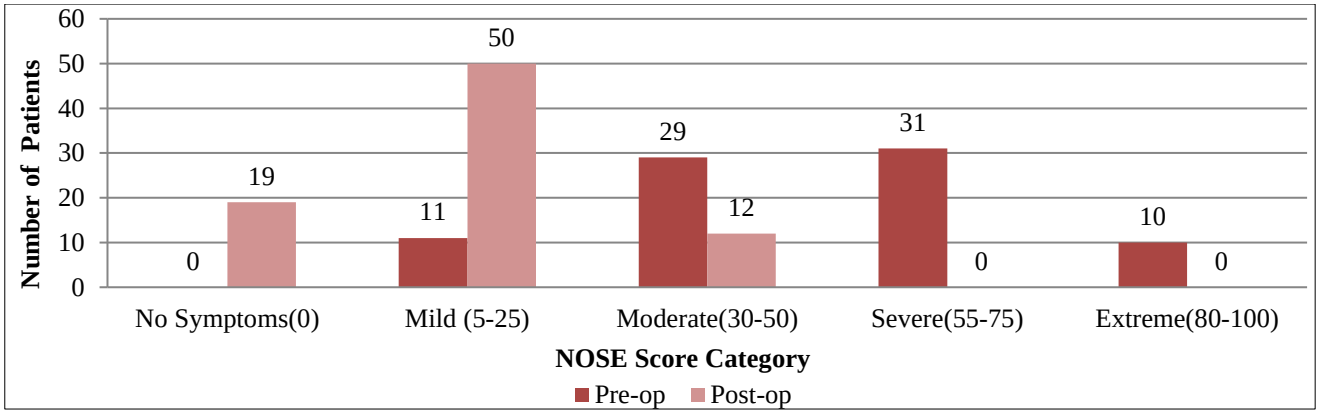

Figure 2: Category wise distribution of NOSE score in pre and post-operative period.

Table 4: NOSE score comparison by age groups.

Age group (years)	Pre-op mean	Pre-op range	Pre-op median	Post-op mean	Post-op range	Post-op median	Improve-ment mean	Improve-ment range	P value
<20	59.74±17.83	30-80	62.5	17.91±14.8	0-40	15.00	41.66±13.02	25-75	<0.001
21-30	52.31±21.33	20-90	50	10.52±9.21	0-35	10.0	41.71±16.97	10-65	<0.001
31-40	52.0±23.39	20-90	50	14.41±10.13	0-35	15.0	37.64±15.01	15-65	<0.001
41-50	58.63±10.97	40-75	60	15.0±9.21	0-30	10.0	43.63±8.39	30-55	<0.001
51-60	72.5±17.68	60-85	72.5	22.5±17.67	10-35	22.5	50.00±2.89	50-55	<0.001

DISCUSSION

In the present study, the demographic analysis revealed a male predominance among patients with symptomatic DNS, consistent with previous literature. The majority of patients belonged to the 21–30-year age group, with 25 males and 7 females, demonstrating that young adult males were more commonly affected. The overall male-to-female ratio was approximately 1.8:1, aligning with findings by Sam et al, who reported a similar male predominance (1.7:1) and a peak incidence in the 31–40-year age group.[17] The mean age in our study was 28.40 years for males and 30.90 years for females, suggesting that DNS predominantly affects individuals in their productive age group, potentially due to trauma or developmental causes.

Symptomatically, nasal obstruction was the most frequent complaint, observed in 80.25% of cases, followed by recurrent watering, sneezing, and headache. Right-sided nasal blockage was slightly more common than left-sided, which aligns with the findings of Moorthy et al, who also identified nasal obstruction as the predominant symptom.[18] However, Shoib et al and Singh et al observed headache as the most common presenting symptom, followed by nasal discharge and obstruction.[19,20] These variations across studies may reflect differences in patient perception, severity of deviation, or associated sino-nasal pathology.

Analysis of symptom duration showed that most patients sought medical attention within the first 10 years of symptom onset, particularly males, who represented the majority in both the 0–5 years and 6–10 years' duration groups. Beyond 10 years, the gender distribution became more balanced, suggesting that while males tend to present earlier, females may experience prolonged but less acute symptoms. Notably, prolonged symptom duration beyond 20 years was reported exclusively in males, possibly due to delayed healthcare-seeking behavior or chronic adaptation to nasal obstruction.

Anterior rhinoscopy revealed right-sided DNS as the most common anatomical finding (55.5%), followed by left-sided deviation (40.7%) and S-shaped DNS (3.7%). This finding differs from the study by Gill et al, who found left-sided deviation to be more common (56.6%).[21] The predominance of right-sided deviation in our cohort may reflect regional or genetic variations, as well as differences in the mechanism of trauma. Allergic rhinitis was observed in 16.04% of cases, supporting the theory that chronic mucosal inflammation may coexist with or exacerbate symptoms of DNS.

Objective measurements and subjective measurements are the two possible methods for evaluating the results of septoplasty. Numerous previous researches have examined the subjective outcomes of individuals following septoplasty. However, the majority of those investigations were retrospective, and the prospective studies used instruments that were not validated for the assessment of nasal obstruction or survey instruments that were not verified.

The assessment of surgical outcomes using the NOSE score demonstrated significant symptomatic improvement across all age groups and genders. Postoperative scores showed a marked reduction from preoperative levels ($p<0.001$), confirming the effectiveness of endoscopic septoplasty in relieving nasal obstruction. Patients with moderate to severe symptoms showed the most dramatic improvement, with many transitioning to mild or asymptomatic categories postoperatively. These results are in accordance with the study by Kumar and Rajashekar, who also reported a statistically significant reduction in NOSE scores at 1, 3, and 6-months following septoplasty.[22] Their study emphasized that managing inferior turbinate hypertrophy alongside septal correction enhances surgical outcomes, underscoring the importance of a comprehensive surgical approach.

Postoperative complications in the present study were minimal. Synechiae occurred in 3 patients and crusting in 6, yet all demonstrated significant postoperative symptom improvement. The absence of major complications such as septal perforation or saddle nose deformity further highlights the safety and precision of the endoscopic approach. This is comparable to findings by Joshi et al, who, in a cohort of 359 patients, reported low rates of postoperative infection (3.3%) and epistaxis (4.5%), with no cases of synechiae or septal perforation.[23]

Overall, the present study reinforces that endoscopic septoplasty provides significant functional improvement with minimal complications. The consistent postoperative reduction in NOSE scores across all age groups and genders validates its efficacy as a minimally invasive, patient-centered intervention for symptomatic DNS. These findings corroborate prior research emphasizing the importance of validated outcome measures in evaluating nasal airway surgery and affirm the role of endoscopic septoplasty as the preferred technique for achieving both anatomical correction and symptomatic relief.

Limitations

The study's limitations include a relatively small sample size, short follow-up period, and lack of analysis of surgical variations and comorbidities. Other major limitation was that it is a subjective assessment so it highly depends upon patient's response unlike objective methods.

CONCLUSION

In this study, factors including age, gender, and persistence of symptom have no significant role in outcome of endoscopic septoplasty. However, there can be higher chances of post-operative complications in patients with high preoperative NOSE scores. The NOSE score proved to be an effective tool for assessing nasal obstruction, demonstrating a significant reduction of mean postoperatively following endoscopic septoplasty. This substantial improvement highlights both the utility of the NOSE score in quantifying symptom severity and the effectiveness of septoplasty in relieving nasal obstruction. Despite minor complications in some cases, most patients had improvement in symptoms, reinforcing the overall success and reliability of the procedure in improving nasal breathing.

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